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# (12) UK Patent Application (19) GB (11) 2 339 184 (13) A

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(56) Documents Cited

GB 1227060 A WO 91/17089 A1 US 4925438 A  
US 4848930 A US 4717262 A US 4450581 A

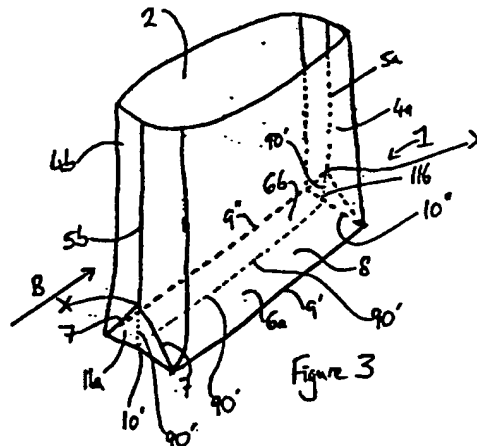
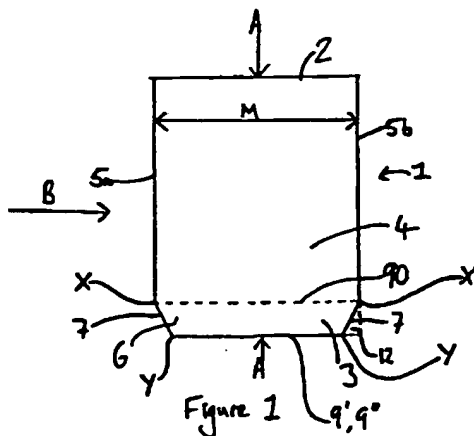
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(54) Abstract Title

Plastic bag for bulk material

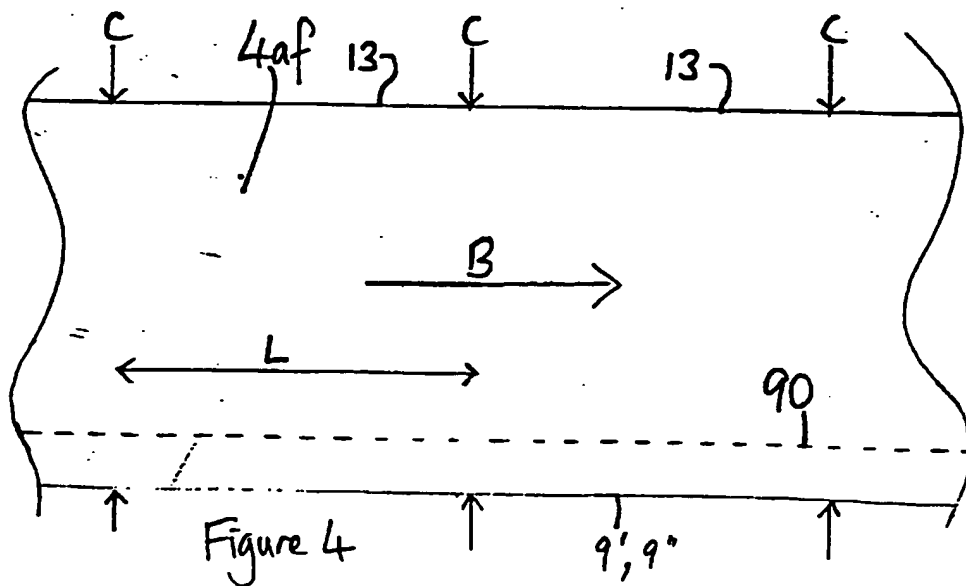
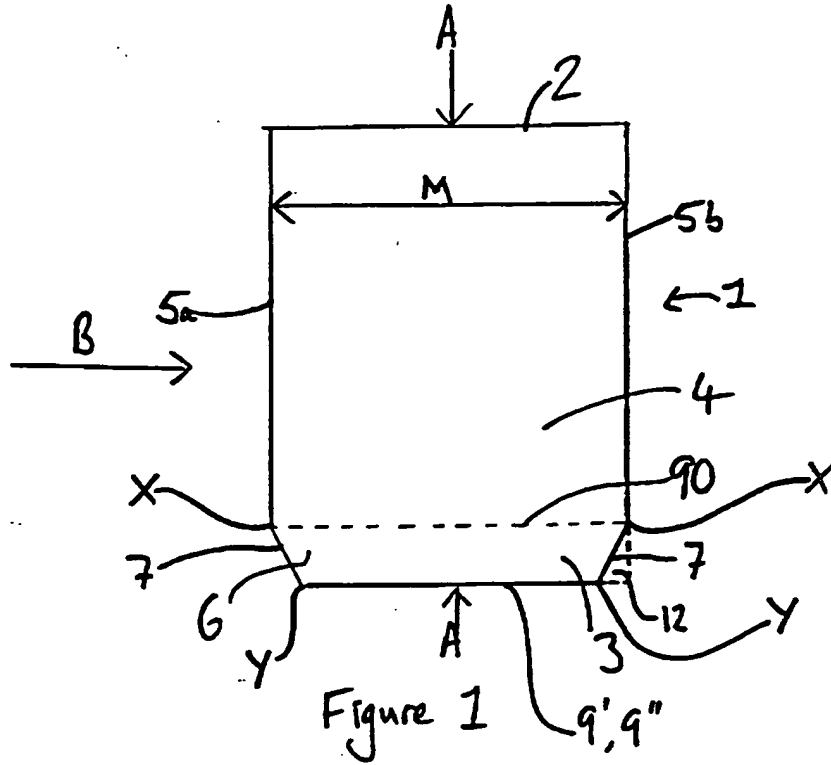
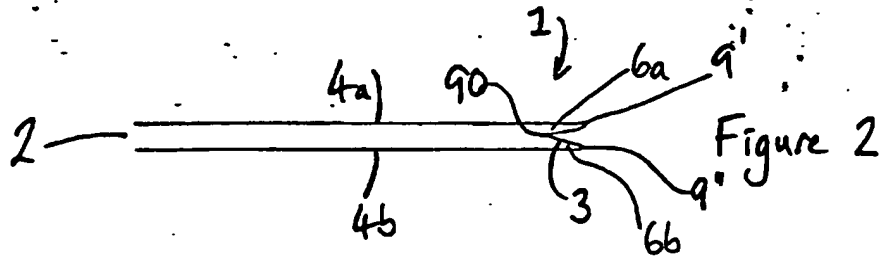
(57) A plastics bag or sack comprises front and back walls 4a, 4b interconnected along their two sides 5a, 5b and a gusseted base panel 6 therebetween, with mitred corner seals 7 joining each of the front and back walls to a respective half 6a, 6b of the base panel. Corner portions 12 beyond the welded mitre seals 7 may be removed. When opened out to receive bulk material as in Figure 3, the gusset panel 6 is flattened and triangular end portions 11a, 11b are exhibited, bounded in part by the seal lines 7 with apices X on the side seals 5a, 5b. The bag may be formed by extrusion with the fold lines 9', 9'', 90 which define the gusset panel 6 being parallel to the direction of extrusion. The bag may have an invertable closure flap (14, Figures 5 and 6) attached to the upper part of one wall 4a.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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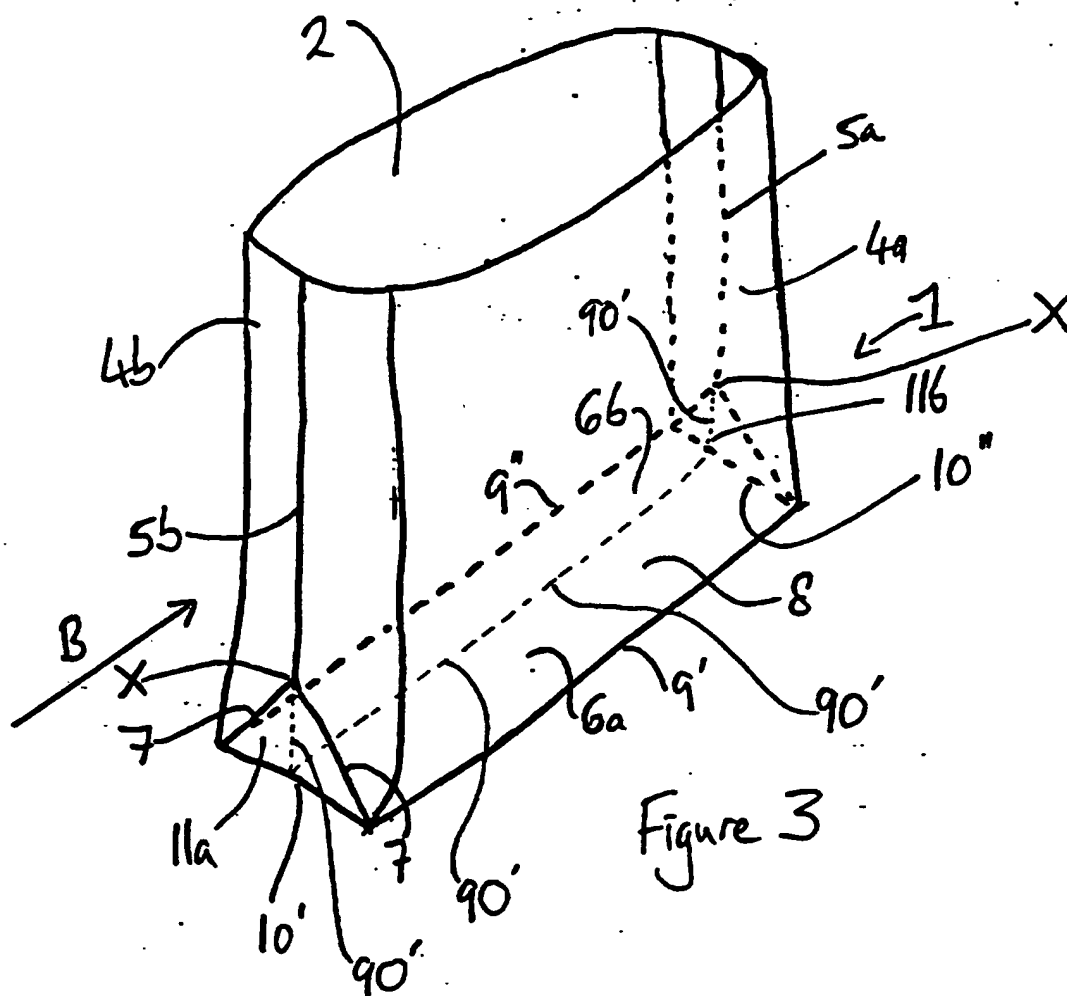


Figure 3

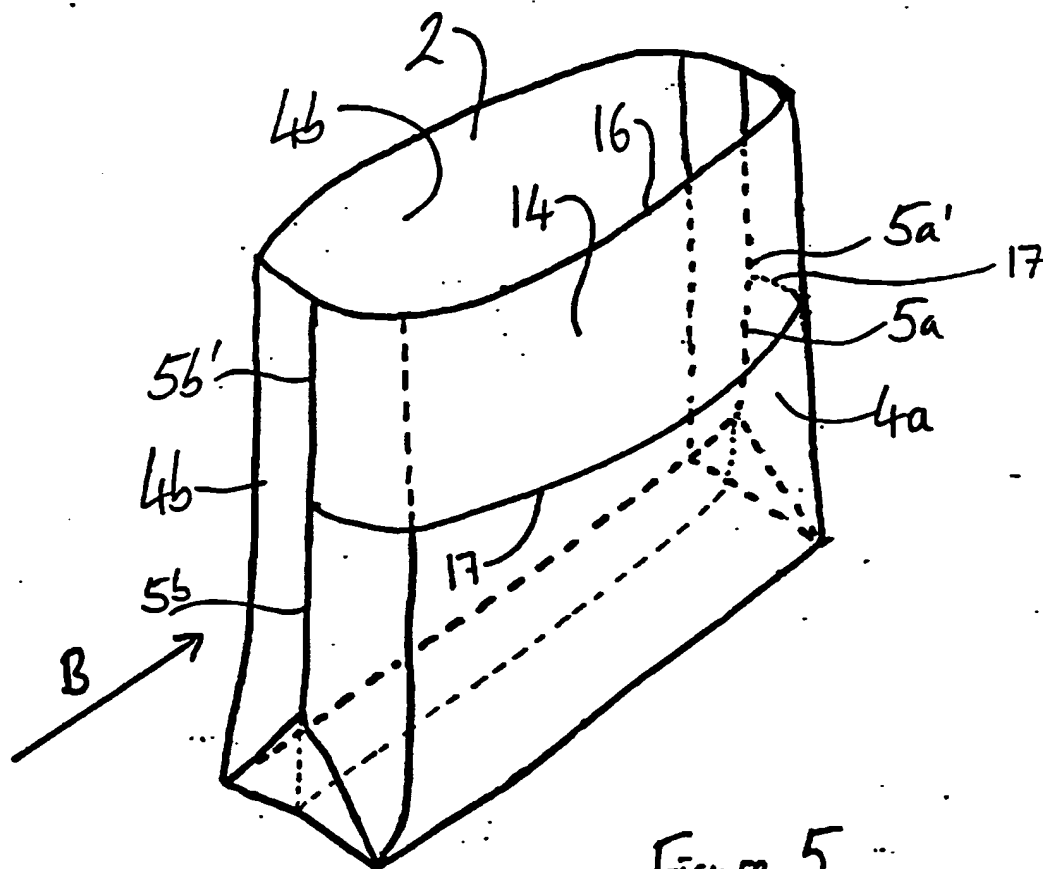


Figure 5

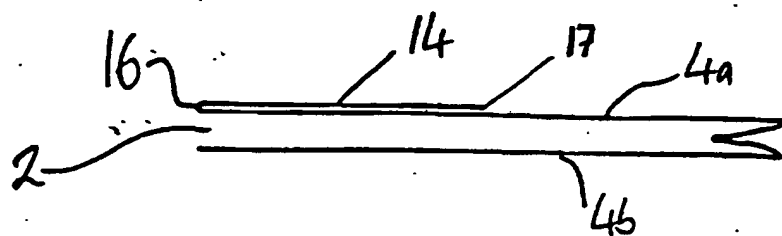


Figure 6

## BAGS

The present invention relates to bags or sacks, and in particular to plastic bags or sacks which are able to stand stably on a surface when containing a bulk solid or liquid product. The bags of the present invention commonly take the form of sacks and are primarily intended for industrial processing uses within and between factory premises, most especially in the food processing industry. The bags of the invention may also be suitable as the external packaging of certain solid and liquid consumer products (such as detergents).

Plastic bags of many different types are known, but one particular problem has been in providing bags (especially industrial sacks) which are easily and relatively cheaply manufactured and which will stand upright and in a stable manner on a surface while containing a product, in particular a relatively heavy product. The bags of the invention are suitable for containing bulk products in the form of powders, granules or liquids. Examples of such products include bulk chemicals and bulk ingredients such as are used in human and animal foodstuffs and in household products such as washing powders and washing liquids; foodstuffs and household products; and garden products such as peat or compost. In the food industry, plastic bags and sacks are especially used in the transport of foods, ingredients or partially prepared food products around or between premises. In the context of this specification, bulk product may include retail consumer products such as liquid and solid detergents and food ingredients for which the bags of the invention may form the external packaging.

In the present invention, there is provided a plastic bag which includes at the base a tuck or gusset, the external corners of which are mitred and the mitred portion

removed. The tuck provides in use a flat base portion on which the bag may rest on a surface, when the bag is filled or being filled with product. Removal of the mitred corner is necessary in order to improve the palletisation of the bag. That is to say, the bags of the present invention are required to be suitable for transportation on a pallet and in order to retain the bags on the pallet a number of bags comprising a pallet load are often shrink wrapped (or otherwise wrapped) onto the pallet. The mitred corners tend to form stiff sharp edges at the base of the bags and, if not removed, will tend to cut or tear the shrink wrapping and or adjacent bags. Similarly, where the bags of the invention form the external packaging of consumer products, the mitred corners are removed to avoid stiff sharp corners which are inconvenient to the consumer and to allow the bags to be more easily stacked on the shelves of shops and supermarkets.

20 In general terms, in the preferred method of making the bags according to the invention the bags are produced by a blown film extrusion process. Alternatively, the bags may be formed from cast films or from laminates. In the preferred process, the bags are formed by blow extruding a suitable plastics material to form a longitudinally extending continuous flat tube. A gusset or tuck is formed along one side edge of the tube by folding the side edge inwardly, as will be explained in more detail below. The longitudinally extending tube is cut laterally to form a plurality of flat tubes (each including the tuck) of shorter length. The open ends of the tube are closed, preferably by heat welding, along their whole length.

35 These closures form the side edges of the bag in use. The two respective portions of the tuck are separated

from each other and a mitre weld is formed at each corner, so that four welds are made in total. Finally, the edge of bag opposed to the tuck and perpendicular to the side welds is opened, such as by cutting, to form an opening through which the bag may be filled with product. This edge may be closed after filling of the bag by any suitable means.

In a less preferred method, the longitudinally extending flat tube is cut laterally to form a plurality of short flat tubes before the formation of the tuck or gusset. One open end of the short tubes is then sealed and a tuck or gusset is formed in this end. Mitre welds are then formed at each corner of the two respective tuck portions.

Accordingly, there is provided a plastic bag for containing bulk product comprising: an open end; a base panel; first and second side walls extending between the open end and the base panel and connected to each other at their marginal edges, the base panel being connected along opposing sides thereof to respective side walls at first folds and including a second fold extending between the marginal edges of the side walls generally parallel to the first folds and dividing the panel into first and second panel leaves, such that the second fold and the panel leaves lie between said side walls with the external faces of the panel leaves towards each other; and mitre seals comprising a seal line extending from each end of said second fold to each first fold, along which seal lines the first and second side walls are respectively joined to the base panel and which mitre seals form corner boundary edges of the bag.

In a particularly preferred variation where the bag is formed by extrusion, said first and second fold lines are



formed substantially parallel to the direction of extrusion. Preferably the first and second side walls and the base panel are unitary, and, also preferably the side walls are joined together along their marginal edges by means of heat welds extending from respective ends of the second fold to the open end.

In other preferred variations of the invention, the seal line of the mitre seal comprises a heat weld and forms an angle of between  $30^{\circ}$  and  $60^{\circ}$ , preferably  $45^{\circ}$ , with respect to the second fold.

In a particularly preferred variation of this aspect of the invention the bag further comprises an invertible closure flap having an upper edge attached to one of said side walls at the open end of the bag, first and second marginal edges attached respectively to the marginal edges of the said side wall and a free edge opposed to the upper edge. Preferably the invertible closure flap is unitary with said side wall and depends from said side wall along a fold line.

According to the invention there is further provided a plastic bag for containing bulk product comprising: an open or openable end; a base panel comprising a generally rectangular base portion having opposed side edges and opposed end edges, and generally triangular first and second end wall portions each depending along a base side thereof from a respective end edge of the base portion; first and second side walls connected to each other at their marginal edges along respective lines of junction, the side walls extending between said open or openable end and said base portion and depending from said base portion along first folds coincident with the opposed side edges of the base portion; the substantially triangular first and second end wall portions having an

apex lying on a line of junction and side edges comprising seal lines extending between said apex and respective corners of the said base portion along which the first and second side panels are respectively joined to the base panel.

In another variation of the invention there is provided a plastic bag containing a bulk product, the bag comprising: a closed upper end; a base panel comprising a generally rectangular base portion having opposed side edges and opposed end edges, and generally triangular first and second end wall portions each depending along a base side thereof from a respective end edge of the base portion; first and second side walls connected to each other at their marginal edges along respective lines of junction, the side walls extending between said closed upper end and said base portion and depending from said base portion along first folds coincident with the opposed side edges of the base portion; the substantially triangular first and second end wall portions having an apex lying on a line of junction and side edges comprising seal lines extending between said apex and respective corners of said base portion along which the first and second side panels are respectively joined to the base panel.

It is particularly preferred that the bag is formed by extrusion and said first folds are substantially parallel to the direction of extrusion, that the first and second side walls and the base panel are unitary and that the lines of junction are heat welds extending from the apex of the end wall portion to the open or openable end.

Preferably also the seal lines are heat welds and form an angle of between  $30^{\circ}$  and  $60^{\circ}$ , preferably  $45^{\circ}$ , with

respect to the base line of the end wall portions.

For a better understanding of the invention, and to show how the same may be carried into effect, reference will  
5 be made (by way of example only) to the following drawings, in which,

Figure 1 is a schematic plan view of a bag according to the invention,  
10

Figure 2 is a section along the line A-A of Figure 1.

Figure 3 is a view of a bag according to the invention in an open condition.  
15

Figure 4 is a schematic plan view of a longitudinally extending flat plastics tube forming a precursor to the bag of the invention.

Figure 5 is a view of a bag according to one variation of the invention in an open condition.  
20

Figure 6 is a schematic cross-sectional view of the bag of Figure 5 in a flat condition.

25 Referring now in particular to Figures 1 and 2, in which the bag 1 is shown in a flat condition prior to filling. The bag 1 comprises an open end 2, a base panel 3 side walls 4a, 4b and marginal edges 5a, 5b. Faces 4a, 4b are  
30 joined at marginal edges 5a, 5b along their entire length by suitable means such as heat welding and/or adhesive, preferably heat welding.

The base panel 3 comprises a tuck or gusset defined by  
35 first folds 9' and 9" and second fold 90. The tuck has panel leaves or tuck leaves 6a and 6b each having two

mitred edges 7. Mitred edges 7 are mitre seals comprising a seal line extending from each end of the second fold 90 (that is, at point X) to the first folds 9', 9" at points Y. The mitred edges 7 thus form corner  
5 boundary edges of the bag. The side walls 4a, 4b are joined to the base panel 3 along these seal lines which preferably comprise heat welds. As can best be seen in Figure 2, second fold 90 and panel leaves 6a, 6b lie between the side walls 4a, 4b with the external faces of  
10 the panel leaves 6a, 6b towards each other.

In the illustrated embodiment where the folds 9', 9", 90 are formed generally in a direction parallel to the direction of extrusion B, the first and second side walls  
15 4a, 4b and the base panel 3 are unitary in that there is no intervening joint in a path passing from the edge of side wall 4a at the open end to the fold 9', the fold 90 and the fold 9" and then to the edge of the side wall 4b at the open end of the bag.

20

In contrast, in the bag formed by the less preferred method, side walls 4a and 4b are not unitary in that the above defined path is interrupted by a joint formed along fold line 90.

25

When the bag is in its flat condition illustrated in Figures 1 and 2, the mitred edge 7 preferably forms an angle of between 30° and 60°, most preferably 45° with respect to the second fold 90.

30

Figure 3 illustrates a bag similar to that of Figures 1 and 2 but in a substantially fully open condition containing, or ready to receive, a product. Side walls 4a, 4b no longer lie substantially flat against each  
35 other as in Figures 1 and 2, but are spaced apart from one another. In the embodiment illustrated the side

edges 4a and 4b are joined to each other along lines of junction at their respective marginal edges 5a and 5b. The lines of junction preferably comprise heat welds along the whole length of marginal edges 5a, 5b although  
 5 other joining means such as adhesive may additionally or alternatively be used.

Upper edges of side walls 4a, 4b define an open end or mouth 2 of the bag. A substantially rectangular base  
 10 portion 8 (which is part of the base panel 3) on which the bag may rest in an upright position is defined by fold lines 9', 9" and 10', 10" and is formed by opening out panel leaves 6a, 6b. Mitred edges 7 now lie  
 15 approximately in a vertical plane, although filling of the bag may cause the mitred edges 7 to be displaced further from the vertical. Mitred edges 7 and fold lines 10', 10" define upstanding generally triangular end wall portions 11a, 11b. Fold lines 10', 10" form the base  
 20 side of portions 11a, 11b and mitred edges 7 from the remaining sides with the apex of the triangles at points X. Thus, in the embodiment illustrated the apex of the triangular end wall portion lies at the end of the lines of junction at marginal edges 5a, 5b. Portions 11a, 11b  
 25 are formed on opening out the panel leaves 6a, 6b and comprise end regions of the base panel 3. Preferably, the mitred edges 7 form an angle of between 30° and 60° with respect to the fold lines 10', 10". Additional  
 30 reinforcements (such as reinforcement welds or adhered reinforcement patches) may be provided where desired, such as at points X where the welds of mitred edges 7 meet the welds of marginal edges 5a, 5b.

The process of producing the bags according to this aspect of the invention will now be described in more  
 35 detail with reference also to Figure 4.

The bags of this aspect of the invention are preferably formed by extrusion of a suitable plastics material usually in a molten state through a die in order to form a continuous tube of the plastics material. The so  
5 formed tube is expanded on leaving the die by blowing air or other gas into the tube and the blown tube is subsequently collapsed to a flat state. A flat tubular film of the plastics material is thereby formed having walls 4af and 4bf (not illustrated) which lie against  
10 each other. The film is formed continuously and may at this stage be taken up on a roller as desired such as for storage. Blow extrusion processes for forming flat tubular films of this sort are well known to persons skilled in the art and need not be described in further  
15 detail here. In each of Figures 1, 3 and 4 arrow B indicates generally the direction in which the tubular film from which the bag is formed is extruded. Thus, arrow B lies generally along the longitudinal axis of the tube.

20 Subsequently, a gusset or tuck is formed along one side of the flat tubular film. This is achieved by folding one edge of the flat tubular film in on itself along fold lines 9', 9" and 90. Suitably, the flat tubular film may  
25 be continuously passed over an appropriate projection (or projections), which deflects the edge the film inwardly to form the tuck. The resulting continuous flat tubular film with the tuck along one side is then cut laterally, such as along the lines indicated by arrows C in Figure 4  
30 to form individual flat tubes whose axial length 2 (that is, the length in the direction of extrusion, B) corresponds generally to the desired final width M of the bags. The resulting tubes are thus open along side edges corresponding to marginal edges 5a and 5b in Figure 1.  
35 These side edges 5a, 5b are sealed along their whole length by suitable means, in accordance with the proposed

use of the bag. Preferably, the side edges are sealed by heat welding, but other means such as adhesives may be used alternatively or in addition. At this stage, the mitred edges 7 may be formed by separating the panel leaves 6a, 6b and forming the mitre by suitable means, such as heat welding, at each of the four corners of the base panel. The resultant generally triangular corner portions, indicated in ghost lines at 12 in Figure 1 are cut off and discarded in order to provide the bag with excellent palletisation properties. Following removal of the triangular corner portions, the mitred edges 7 form the corner boundary edges of the bag at its base end. In order to form the final bag the edge of the bag opposed to the base panel (originally edge 13 in Figure 4) is opened to form open end 2 of the bag, by means of which the bag may be filled with the desired contents. Open end 2 may suitably be formed by cutting away a portion of the edge 13.

It will be appreciated that the order of certain of the steps described above may be varied. For example, the open end 2 may be formed before the mitred edges 7.

In the above-mentioned less preferred method of forming the bags according to the invention, the longitudinally extending flat tube formed by blow extrusion is cut laterally to form a plurality of short flat tubes. One open end of the tube is then sealed along its whole width such as by heat welding and a tuck or gusset is formed in this end. Mitre seals are then formed in the same manner as in the preferred method.

The bag prepared by this method differs from that illustrated in figures 1 to 3 in some respects. Thus, second fold line 90 now lies on the joint between the first and second side walls 4a, 4b. This joint is

illustrated by means of dotted line 90' in Figure 3. Also, no joint is formed at marginal edges 5a, 5b. The lines of junction at marginal edges 5a, 5b of side walls 4a, 4b are therefore notional lines at which the side walls 4a, 4b meet, the surface of the bag being continuous through side edges 5a, 5b with no intervening joint.

Thus, by means of the invention it is possible to provide a bag which can stand stably in an upright position, which is suitable for carrying heavy and bulky materials, which is simple and cost effective to manufacture in an automated process and which provides excellent palletisation properties.

In a variation of the invention there is provided a bag having an easy-to-use closure portion. This type of bag is particularly suited for the transport of partially prepared food products within a factory and an example of such a bag is illustrated in Figures 5 and 6. Other suitable uses will be readily apparent to those skilled in the art. Features which are identical to or similar to those of Figure 3 have not been specifically identified and will not be described again in detail. Bags of this type illustrated in Figures 5 and 6 are usually placed in a shallow tray such as of cardboard so that the flat base 8 lies against the base of the tray. Food products or the like are then placed inside the bag and the bag is closed.

The bag of this embodiment includes a flap 14 provided on side wall 4a of the bag. The flap 14 is defined by edge line 16, free edge 17 on the side of the flap 14 opposed to edge line 16 and side edges 5a' and 5b' which are attached along their entire length (preferably by heat welding) to the wall 4a. Preferably the edges 5a' and



5b' are superposed on edges 5a, 5b respectively. Edge line 16 may be a joint along which the flap 14 is attached to the side wall 4a. More preferably, the flap 14 is formed integrally with the side wall 4a and the edge line 16 is a fold line

Closure of the bag is effected by inverting the flap 14 about edge line 16 so that the upper part of wall 4b is tucked underneath the flap 14. Thus, in the closed condition of the bag outer surface 14a of the flap 14 lies against wall 4b, inner surface 14b of the flap 14 becomes the exterior surface and the whole of wall 4a is exposed. Flap 14 remains attached along the whole length of edges 5a', 5b'. This closure provides an easy and convenient means by which products contained in the bag, especially foods products, can be shielded from contamination. The bag may easily be re-opened by inverting the flap 14 back to its original position and this process may be repeated as often as desired.

## CLAIMS

1. A plastic bag for containing bulk product comprising: an open end; a base panel; first and second  
5 side walls extending between the open end and the base panel and connected to each other at their side marginal edges, the base panel being connected along opposing sides thereof to respective side walls at first folds and including a second fold extending between the marginal  
10 edges of the side walls generally parallel to the first folds and dividing the base panel into first and second panel leaves, such that the second fold and the panel leaves lie between said side walls with the external faces of the panel leaves towards each other; and mitre  
15 seals comprising a seal line extending from each end of said second fold to each first fold, along which seal lines the first and second side walls are respectively joined to the base panel and which mitre seals form corner boundary edges of the bag.
- 20 2. A plastic bag as claimed in claim 1 wherein said bag is formed by extrusion and said first and second fold lines are formed substantially parallel to the direction of extrusion.
- 25 3. A plastic bag as claimed in claim 2 wherein the first and second side walls and the base panel are unitary.
- 30 4. A plastic bag as claimed in claim 1, 2 or 3 wherein the said walls are joined together along said marginal edges by means of heat welds extending from respective ends of the second fold to the open end.
- 35 5. A plastic bag as claimed in claim 1, 2, 3 or 4 wherein the seal line of the mitre seals comprises a heat

weld.

6. A plastic bag as claimed in any preceding claim wherein the seal line of the mitre seals forms an angle of between 30° and 60° with respect to the second fold.

7. A plastic bag as claimed in claim 6 wherein the seal line of the mitre seals forms an angle of 45° with the second fold.

10

8. A plastic bag as claimed in any preceding claim further comprising an invertable closure flap having an upper edge attached to one of said side walls at the open end of the bag, first and second marginal edges attached respectively to the first and second marginal edges of the said side wall and a free edge opposed to the upper edge.

20

9. A plastic bag for containing bulk product comprising: an open or openable end; a base panel comprising a generally rectangular base portion having opposed side edges and opposed end edges, and generally triangular first and second end wall portions each depending along a base side thereof from a respective end edge of the base portion; first and second side walls connected to each other at their marginal edges along respective lines of junction, the side walls extending between said open or openable end and said base portion and depending from said base portion along first folds coincident with the opposed side edges of the base portion; the substantially triangular first and second end wall portions having an apex lying on a line of junction and side edges comprising seal lines extending between said apex and respective corners of said base portion along which the first and second side panels are respectively joined to the base panel.

30

35

10. A plastic bag as claimed in claim 9 wherein said bag is formed by extrusion and said first folds are substantially parallel to the direction of extrusion.

5

11. A plastic bag as claimed in claim 10 wherein the first and second side walls and the base panel are unitary.

10 12. A plastic bag as claimed in claim 9, 10 or 11 wherein the lines of junction are heat welds extending from the apex of the end wall portion to the openable end.

15 13. A plastic bag as claimed in any of claims 9 to 12 wherein the seal lines are heat welds.

14. A plastic bag as claimed in any of claims 9 to 13 wherein the seal lines form an angle of between 30° and  
20 60° with respect to the base line of the end wall portions.

15. A plastic bag as claimed in claim 14 wherein the seal lines form an angle of 45° with respect to the base  
25 line.

16. A plastic bag as claimed in any of claims 9 to 15 further comprising an invertable closure flap having an upper edge attached to one of said side walls at the open  
30 end of the bag, first and second marginal edges attached respectively to the first and second marginal edges of the said side wall and a free edge opposed to the upper edge.

35 17. A plastic bag containing a bulk product comprising: a closed upper end; a base panel, the bag comprising a

generally rectangular base portion having opposed side edges and opposed end edges, and generally triangular first and second end wall portions each depending along a base side thereof from a respective end edge of the base portion; first and second side walls connected to each other at their marginal edges along respective lines of junction, the side walls extending between said closed upper end and said base portion and depending from said base portion along first folds coincident with the opposed side edges of the base portion; the substantially triangular first and second end wall portions having an apex lying on a line of junction and side edges comprising seal lines extending between said apex and respective corners of said base portion along which the first and second side panels are respectively joined to the base panel.

18. A bag substantially as hereinbefore described with reference to and/or as illustrated in any of Figures 1 to 6.



Applicati n No: GB 9814771.3  
Claims searched: 1-8 & 18

Examiner: Stephen Smith  
Date of search: 1 October 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.P): B8K(KAB)

Int CI (Ed.6): B65D 30/10, 30/18

Other: ONLINE:WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1227060 (CANADIAN INDUSTRIES) lines 8-24 of page 2, Figures 1 and 7	1, 4 -7
X	WO 91/17089 A1 (JEBCO PACKAGING) line 32 of page 11 to line 17 of page 12	1, 4 -7
X	US 4925438 (WAGNER) lines 34-40 of column 5	1, 4 -7
X	US 4848930 (WILLIAMS) lines 39-63 of column 2	1, 4 -7
X	US 4717262 (ROEN) lines 11-31 of column 7, lines 6-31 of column 9	1-7
X	US 4450581 (HIRATA) lines 39-48 of column 3, Figure 2	1, 4 -7

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
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